

LESSON

8.5

Name _____ Date _____

Study Guide

For use with pages 412–417

GOAL**Graph linear equations in slope-intercept form.****VOCABULARY**

A linear equation of the form $y = mx + b$ is said to be in **slope-intercept form**. The slope is m and the y-intercept is b .

EXAMPLE 1 Identifying the Slope and y-Intercept

Identify the slope and y-intercept of the line with the given equation.

a. $y = 5 - 4x$

b. $2x - 5y = 15$

Solution

- a. Write the equation
- $y = 5 - 4x$
- as
- $y = -4x + 5$
- .

Answer: The line has a slope of -4 and a y-intercept of 5 .

- b. Write the equation
- $2x - 5y = 15$
- in slope-intercept form by solving for
- y
- .

$$2x - 5y = 15$$

Write original equation.

$$-5y = -2x + 15$$

Subtract $2x$ from each side.

$$y = \frac{2}{5}x - 3$$

Multiply each side by $-\frac{1}{5}$.

$$= \frac{2}{5}x + (-3)$$

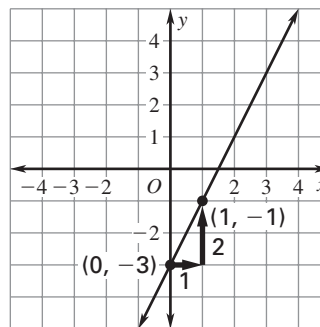
Rewrite $\frac{2}{5}x - 3$ as $\frac{2}{5}x + (-3)$.**Answer:** The line has a slope of $\frac{2}{5}$ and a y-intercept of -3 .**EXAMPLE 2** Graphing an Equation in Slope-Intercept FormGraph the equation $y = 2x - 3$.

- (1) The y-intercept is
- -3
- , so plot the point
- $(0, -3)$
- .

- (2) The slope is
- $2 = \frac{2}{1}$
- .

Starting at $(0, -3)$, plot another point by moving right 1 unit and up 2 units.

- (3) Draw a line through the two points.

**Exercises for Examples 1 and 2**

Identify the slope and y-intercept of the line with the given equation. Use the slope and y-intercept to graph the equation.

1. $y = -5x + 4$

2. $y - x = 1$

3. $9x + 3y = 10$

4. $y + 2 = 4x$

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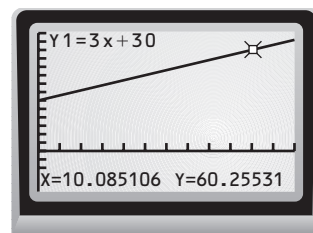
EXAMPLE 3 Using Slope and y-Intercept in Real Life

You belong to a fitness club. The membership fee is \$30 per month. If you are a member, water aerobics classes are \$3 per session.

- Write an equation that gives the total monthly fitness club cost as a function of the number of water aerobics sessions you attend per month.
- Find the maximum number of sessions you can attend per month and not exceed your \$60 monthly fitness budget.

Solution

- Let x be the number of water aerobics sessions you attend during the month, and let y be the total monthly fitness club cost for that number of sessions. The equation that gives the total monthly fitness club cost as a function of the number of water aerobics sessions attended per month is $y = 3x + 30$.
- Graph $y = 3x + 30$ on a graphing calculator. Trace along the graph until the cursor is on a point where $y \approx 60$. For this point, $x \approx 10$. So, the maximum number of sessions you can attend is about 10.

**EXAMPLE 4 Finding Slopes of Parallel and Perpendicular Lines**

- Find the slope of a line parallel to $15y - 3x = 5$.

$$y = \frac{1}{5}x + \frac{1}{3} \quad \text{Write original equation in slope-intercept form.}$$

The slope of the given line is $\frac{1}{5}$. Because parallel lines have the same slope, the slope of a parallel line is also $\frac{1}{5}$.

- Find the slope of a line perpendicular to $15y - 3x = 5$.

From part (a), the slope of the given line is $\frac{1}{5}$. The slope of a perpendicular line is the negative reciprocal of $\frac{1}{5}$, or -5 .

Exercises for Examples 3 and 4

- Entrance to an amusement park is \$20 and games are \$3 each. Write an equation that gives the total cost of admission and games. Find the maximum number of games you can play if you have \$40.

For the line with the given equation, find the slope of a parallel line and the slope of a perpendicular line.

6. $5y - 10x = 7$

7. $11y + 7x = 22$

8. $2y + 5x = 12$

9. $y + x = 10$